

Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

- 1 1. (Currently Amended) A method for configuring multiple resources in a system,
2 comprising:
3 providing a plurality of elements capable of configuring resources in the
4 system, wherein each element specifies configuration parameters to use to
5 configure instances of the resource, and wherein each resource is capable of
6 being configured by multiple elements ~~that provide~~, each of which provides a
7 different configuration of the resource;
8 maintaining service information for each element indicating at least one
9 service attribute that results from the configuration of ~~the a~~ resource by ~~the that~~
10 element;
11 receiving at least one administrator specified service attribute for a
12 configuration;
13 ~~determining~~ comparing the administrator specified service attribute to the
14 service information to determine at least one element ~~for each and~~ resource
15 configured thereby having for which the service information ~~indicating at least~~
16 ~~one performance and availability~~ indicates a service attribute that ~~satisfies~~
17 matches the at least one administrator specified service attribute;
18 ~~determining resource instances capable of being configured by the~~
19 ~~determined elements; and~~
20 using the determined elements to configure ~~the selected~~ resource
21 instances indicated in the service information to implement the specified service
22 attributes.

- 1 2. (Original) The method of claim 1, further comprising:

2 receiving information indicating a specified host from the administrator for
3 which the resources will be configured, and wherein the configured resource
4 instances are used by the specified host.

1 3. (Original) The method of claim 1, wherein at least one resource to configure
2 comprises a storage resource, wherein storage elements are capable of
3 providing different configurations of the storage resources, further comprising:
4 determining total available storage space at the determined storage
5 resource instances;
6 presenting information on the total available storage space; and
7 receiving administrator input in response to the presented information
8 indicating selected storage space less than the available storage space to
9 allocate.

1 4. (Original) The method of claim 3, further comprising:
2 determining storage resource instances capable of being configured by
3 the determined storage element to allocate the administrator selected storage
4 space.

1 5. (Original) The method of claim 1, wherein at least one resource comprises a
2 switch, wherein the service information for switch elements that configure the
3 switch resource indicates a data throughput of the switch, wherein the
4 administrator specified service attribute indicates a specified data throughput,
5 wherein the determined switch element has service information that satisfies the
6 specified data throughput, and wherein the determined switch element configures
7 at least one switch instance to provide the specified data throughput.

1 6. (Original) The method of claim 1, wherein at least one resource comprises a host
2 adaptor in a host, wherein the resources are being configured for use by the
3 host, wherein the service information for switch elements that configure the
4 switch resource indicates one of multiple availability levels, wherein the

5 administrator specified service attribute indicates a specified availability level,
6 wherein the determined host adaptor element has service information that
7 satisfies the specified availability level, and wherein the determined host adaptor
8 element configures at least one host adaptor instance in the host to provide the
9 administrator specified availability level.

1 7. (Original) The method of claim 6, wherein the administrator specified availability
2 level defines redundant paths from the host to storage resources, and wherein
3 the determined host adaptor element configures multiple host adaptors in the
4 host to enable multiple paths to communicate with the storage resource.

1 8. (Original) The method of claim 1, wherein at least one resource comprises a
2 switch, wherein the service attributes in the service information for switch
3 elements that configure the switch resource indicates an availability level
4 indicating whether redundant switch components are provided with the
5 configuration, wherein the administrator specified service attribute indicates one
6 specified availability level, wherein the determined switch element has service
7 information that satisfies the specified availability level, and wherein the
8 determined switch element configures switch components to provide the
9 specified availability level.

1 9. (Original) The method of claim 1, wherein at least one of the determined
2 resources comprises a storage resource, wherein the service information
3 associated with storage elements that configure the storage resource includes at
4 least one service attribute indicating an availability attribute, wherein the
5 administrator specified service attributes for the storage resource indicates one
6 specified availability level, and wherein the selected storage element that
7 configures the storage resource has service information that satisfies the
8 administrator specified availability level.

1 10. (Original) The method of claim 1, wherein the resources to configure are
2 members of the set of configurable resources comprising a host adaptor, switch,
3 storage resource, virtualization appliance, volume manager, and snapshot
4 program.

1 11. (Original) The method of claim 1, wherein the resources to configure include a
2 host adaptor, switch, and storage device, wherein the administrator specified
3 service attribute includes one of a first availability option, second availability
4 option, and third availability option, wherein the first availability option does not
5 define any data and hardware redundancy, wherein the second availability option
6 defines data redundancy for the configured storage device, and wherein the third
7 availability option defines data redundancy of the configured storage device and
8 redundancy of at least one other switch or host adaptor component.

1 12. (Original) The method of claim 1, wherein the administrator specified at least one
2 service attribute indicates availability and performance for the host adaptor,
3 switch, and storage devices to configure for a host, and wherein the determined
4 elements for configuring the host adaptor, switch, and storage devices have
5 service information that satisfies the administrator specified availability and
6 performance attributes for the host adaptor, switch, and storage device.

1 13. (Original) The method of claim 1, wherein the administrator specified service
2 attribute indicates to provide a redundant instance of at least one resource, and
3 wherein at least one determined element has service information indicating a
4 redundant instance of the at least one resource indicated as redundant by the
5 administrator specified availability.

1 14. (Original) The method of claim 1, further comprising:
2 registering, with each element, a proxy object including interfaces used to
3 access the element with a lookup service, wherein the proxy object includes the
4 service information, and wherein the elements are used to configure the selected

resources by using the interfaces for the elements maintained in the element proxy objects.

15. (Currently Amended) A method for configuring storage resources in a system, comprising:

providing a plurality of storage elements capable of configuring the storage resources in the system, wherein each storage element specifies configuration parameters to use to configure the storage resource, and wherein each storage resource is capable of being configured by multiple storage elements, each of which provides a different configuration of the storage resource;

maintaining service information for each storage element indicating at least one storage attribute resulting from the configuration of a resource by the element;

receiving at least one administrator specified service attribute for the configuration of the storage resource;

determining comparing the administrator specified service attribute to the service information to determine one storage element and storage resource configured thereby having for which the service information indicating at least one indicates a service attribute that satisfies matches the administrator specified service attribute;

~~determining storage resource instances capable of being configured by the determined element; and~~

using the determined storage element to configure the ~~determined storage~~ resources indicated in the service information to implement the specified service attributes.

16. (Original) The method of claim 15, wherein the administrator specified service attribute indicates a level of data redundancy for the storage resource to configure.

1 17. (Original) The method of claim 15, wherein the at least one service attribute in
2 the service information indicates at least one performance and availability
3 attribute resulting from the configuration of the resource by the element.

1 18. (Original) The method of claim 15, wherein the configurable storage resources
2 comprise virtualization appliances.

1 19. (Currently Amended) A system for configuring multiple resources, comprising:
2 a plurality of configurable resources;
3 means for providing a plurality of elements capable of configuring the
4 resources in the system, wherein each element specifies configuration
5 parameters to use to configure instances of the resource, and wherein each
6 resource is capable of being configured by multiple elements that provide each of
7 which provides a different configuration of the resource;
8 means for maintaining service information for each element indicating at
9 least one service attribute that results from the configuration of the a resource by
10 the that element;
11 means for receiving at least one administrator specified service attribute
12 for a configuration;
13 means for determining comparing the administrator specified service
14 attribute to the service information to determine at least one element for each
15 and resource configured thereby having for which the service information
16 indicating at least one performance and availability indicates a service attribute
17 that satisfies matches the at least one administrator specified service attribute;
18 ~~means for determining resource instances capable of being configured by~~
19 ~~the determined elements; and~~
20 means for using the determined elements to configure ~~the selected~~
21 resource instances indicated in the service information to implement the specified
22 service attributes.

1 20. (Original) The system of claim 19, further comprising:

2 means for receiving information indicating a specified host from the
3 administrator for which the resources will be configured, and wherein the
4 configured resource instances are used by the specified host.

1 21. (Original) The system of claim 19, wherein at least one resource to configure
2 comprises a storage resource, wherein storage elements are capable of
3 providing different configurations of the storage resources, further comprising:

4 means for determining total available storage space at the determined
5 storage resource instances;

6 means for presenting information on the total available storage space; and

7 means for receiving administrator input in response to the presented
8 information indicating selected storage space less than the available storage
9 space to allocate.

1 22. (Original) The system of claim 21, further comprising:

2 means for determining storage resource instances capable of being
3 configured by the determined storage element to allocate the administrator
4 selected storage space.

1 23. (Original) The system of claim 19, wherein at least one resource comprises a
2 switch, wherein the service information for switch elements that configure the
3 switch resource indicates a data throughput of the switch, wherein the
4 administrator specified service attribute indicates a specified data throughput,
5 wherein the determined switch element has service information that satisfies the
6 specified data throughput, and wherein the determined switch element configures
7 at least one switch instance to provide the specified data throughput.

1 24. (Original) The system of claim 19, wherein at least one resource comprises a
2 host adaptor in a host, wherein the resources are being configured for use by the
3 host, wherein the service information for switch elements that configure the
4 switch resource indicates one of multiple availability levels, wherein the

5 administrator specified service attribute indicates a specified availability level,
6 wherein the determined host adaptor element has service information that
7 satisfies the specified availability level, and wherein the determined host adaptor
8 element configures at least one host adaptor instance in the host to provide the
9 administrator specified availability level.

1 25. (Original) The system of claim 24, wherein the administrator specified availability
2 level defines redundant paths from the host to storage resources, and wherein
3 the determined host adaptor element configures multiple host adaptors in the
4 host to enable multiple paths to communicate with the storage resource.

1 26. (Original) The system of claim 19, wherein at least one resource comprises a
2 switch, wherein the service attributes in the service information for switch
3 elements that configure the switch resource indicates an availability level
4 indicating whether redundant switch components are provided with the
5 configuration, wherein the administrator specified service attribute indicates one
6 specified availability level, wherein the determined switch element has service
7 information that satisfies the specified availability level, and wherein the
8 determined switch element configures switch components to provide the
9 specified availability level.

1 27. (Original) The system of claim 19, wherein at least one of the determined
2 resources comprises a storage resource, wherein the service information
3 associated with storage elements that configure the storage resource includes at
4 least one service attribute indicating an availability attribute, wherein the
5 administrator specified service attributes for the storage resource indicates one
6 specified availability level, and wherein the selected storage element that
7 configures the storage resource has service information that satisfies the
8 administrator specified availability level.

1 28. (Original) The system of claim 19, wherein the resources to configure are
2 members of the set of configurable resources comprising a host adaptor, switch,
3 storage resource, virtualization appliance, volume manager, and snapshot
4 program.

1 29. (Original) The system of claim 19, wherein the resources to configure include a
2 host adaptor, switch, and storage device, wherein the administrator specified
3 service attribute includes one of a first availability option, second availability
4 option, and third availability option, wherein the first availability option does not
5 define any data and hardware redundancy, wherein the second availability option
6 defines data redundancy for the configured storage device, and wherein the third
7 availability option defines data redundancy of the configured storage device and
8 redundancy of at least one other switch or host adaptor component.

1 30. (Original) The system of claim 19, wherein the administrator specified at least
2 one service attribute indicates availability and performance for the host adaptor,
3 switch, and storage devices to configure for a host, and wherein the determined
4 elements for configuring the host adaptor, switch, and storage devices have
5 service information that satisfies the administrator specified availability and
6 performance attributes for the host adaptor, switch, and storage device.

1 31. (Original) The system of claim 19, wherein the administrator specified service
2 attribute indicates to provide a redundant instance of at least one resource, and
3 wherein at least one determined element has service information indicating a
4 redundant instance of the at least one resource indicated as redundant by the
5 administrator specified availability.

1 32. (Original) The system of claim 19, further comprising:
2 a lookup server including lookup service;
3 means for registering, for each element, a proxy object including
4 interfaces used to access the element with the lookup service, wherein the proxy

5 object includes the service information, and wherein the elements are used to
6 configure the selected resources by using the interfaces for the elements
7 maintained in the element proxy objects.

1 33. (Currently Amended) A system for configuring storage resources in a system,
2 comprising:
3 storage resources;

4 means for providing a plurality of storage elements capable of configuring
5 the storage resources in the system, wherein each storage element specifies
6 configuration parameters to use to configure the storage resource, and wherein
7 each storage resource is capable of being configured by multiple storage
8 elements, each of which provides a different configuration of the storage
9 resource;

10 means for maintaining service information for each element indicating at
11 least one storage attribute resulting from the configuration of a storage resource
12 by the that element;

13 means for receiving at least one administrator specified service attribute
14 for the configuration of the storage resource;

15 means for ~~determining~~ comparing the administrator specified service
16 attribute to the service information to determine one storage element and storage
17 resource configured thereby having for which the service information indicating
18 indicates at least one service attribute that ~~satisfies~~ matches the administrator
19 specified service attribute;

20 ~~means for determining storage resource instances capable of being~~
21 ~~configured by the determined element; and~~

22 means for using the determined storage element to configure the
23 determined storage resources indicated in the service information to implement
24 the specified service attributes.

1 34. (Original) The system of claim 33, wherein the administrator specified service
2 attribute indicates a level of data redundancy for the storage resource to
3 configure.

1 35. (Original) The system of claim 33, wherein the at least one service attribute in the
2 service information indicates at least one performance and availability attribute
3 resulting from the configuration of the resource by the element.

1 36. (Original) The method of claim 33, wherein the configurable storage resources
2 include virtualization appliances.

1 37. (Currently Amended) An article of manufacture including code for configuring
2 multiple resources in a system, wherein the code causes operations comprising:
3 providing a plurality of elements capable of configuring resources in the
4 system, wherein each element specifies configuration parameters to use to
5 configure instances of the resource, and wherein each resource is capable of
6 being configured by multiple elements that provide, each of which provides a
7 different configuration of the resource;

8 maintaining service information for each element indicating at least one
9 service attribute that results from the configuration of ~~the~~ a resource by ~~the~~ that
10 element;

11 receiving at least one administrator specified service attribute for a
12 configuration;

13 ~~determining~~ comparing the administrator specified service attribute to the
14 service information to determine at least one element ~~for each and~~ and resource
15 configured thereby having for which the service information ~~indicating at least~~
16 ~~one performance and availability~~ indicates a service attribute that ~~satisfies the~~ at
17 matches least one administrator specified service attribute;

18 ~~determining resource instances capable of being configured by the~~
19 ~~determined elements; and~~

20 using the determined elements to configure ~~the selected~~ resource
21 instances indicated in the service information to implement the specified service
22 attributes.

1 38. (Original) The article of manufacture of claim 37, wherein the code further causes
2 operations comprising:

3 receiving information indicating a specified host from the
4 administrator for which the resources will be configured, and wherein the
5 configured resource instances are used by the specified host.

1 39. (Original) The article of manufacture of claim 37, wherein at least one resource to
2 configure comprises a storage resource, wherein storage elements are capable
3 of providing different configurations of the storage resources, wherein the code
4 further causes operations comprising:

5 determining total available storage space at the determined storage
6 resource instances;

7 presenting information on the total available storage space; and

8 receiving administrator input in response to the presented information
9 indicating selected storage space less than the available storage space to
10 allocate.

1 40. (Original) The article of manufacture of claim 39, wherein the code further causes
2 operations comprising:

3 determining storage resource instances capable of being configured by
4 the determined storage element to allocate the administrator selected storage
5 space.

1 41. (Original) The article of manufacture of claim 37, wherein at least one resource
2 comprises a switch, wherein the service information for switch elements that
3 configure the switch resource indicates a data throughput of the switch, wherein
4 the administrator specified service attribute indicates a specified data throughput,

5 wherein the determined switch element has service information that satisfies the
6 specified data throughput, and wherein the determined switch element configures
7 at least one switch instance to provide the specified data throughput.

1 42. (Original) The article of manufacture of claim 37, wherein at least one resource
2 comprises a host adaptor in a host, wherein the resources are being configured
3 for use by the host, wherein the service information for switch elements that
4 configure the switch resource indicates one of multiple availability levels, wherein
5 the administrator specified service attribute indicates a specified availability level,
6 wherein the determined host adaptor element has service information that
7 satisfies the specified availability level, and wherein the determined host adaptor
8 element configures at least one host adaptor instance in the host to provide the
9 administrator specified availability level.

1 43. (Original) The article of manufacture of claim 42, wherein the administrator
2 specified availability level defines redundant paths from the host to storage
3 resources, and wherein the determined host adaptor element configures multiple
4 host adaptors in the host to enable multiple paths to communicate with the
5 storage resource.

1 44. (Original) The article of manufacture of claim 37, wherein at least one resource
2 comprises a switch, wherein the service attributes in the service information for
3 switch elements that configure the switch resource indicates an availability level
4 indicating whether redundant switch components are provided with the
5 configuration, wherein the administrator specified service attribute indicates one
6 specified availability level, wherein the determined switch element has service
7 information that satisfies the specified availability level, and wherein the
8 determined switch element configures switch components to provide the
9 specified availability level.

1 45. (Original) The article of manufacture of claim 37, wherein at least one of the
2 determined resources comprises a storage resource, wherein the service
3 information associated with storage elements that configure the storage resource
4 includes at least one service attribute indicating an availability attribute, wherein
5 the administrator specified service attributes for the storage resource indicates
6 one specified availability level, and wherein the selected storage element that
7 configures the storage resource has service information that satisfies the
8 administrator specified availability level.

1 46. (Original) The article of manufacture of claim 37, wherein the resources to
2 configure are members of the set of configurable resources comprising a host
3 adaptor, switch, storage resource, virtualization appliance, volume manager, and
4 snapshot program.

1 47. (Original) The article of manufacture of claim 37, wherein the resources to
2 configure include a host adaptor, switch, and storage device, wherein the
3 administrator specified service attribute includes one of a first availability option,
4 second availability option, and third availability option, wherein the first availability
5 option does not define any data and hardware redundancy, wherein the second
6 availability option defines data redundancy for the configured storage device, and
7 wherein the third availability option defines data redundancy of the configured
8 storage device and redundancy of at least one other switch or host adaptor
9 component.

1 48. (Original) The article of manufacture of claim 37, wherein the administrator
2 specified at least one service attribute indicates availability and performance for
3 the host adaptor, switch, and storage devices to configure for a host, and
4 wherein the determined elements for configuring the host adaptor, switch, and
5 storage devices have service information that satisfies the administrator specified
6 availability and performance attributes for the host adaptor, switch, and storage
7 device.

- 1 49. (Original) The article of manufacture of claim 37, wherein the administrator
2 specified service attribute indicates to provide a redundant instance of at least
3 one resource, and wherein at least one determined element has service
4 information indicating a redundant instance of the at least one resource indicated
5 as redundant by the administrator specified availability.
- 1 50. (Original) The article of manufacture of claim 37, wherein the code further causes
2 operations comprising:
3 registering, with each element, a proxy object including interfaces used to
4 access the element with a lookup service, wherein the proxy object includes the
5 service information, and wherein the elements are used to configure the selected
6 resources by using the interfaces for the elements maintained in the element
7 proxy objects.
- 1 51. (Currently Amended) An article of manufacture for configuring storage resources
2 in a system, wherein the code causes operations comprising:
3 providing a plurality of storage elements capable of configuring the
4 storage resources in the system, wherein each storage element specifies
5 configuration parameters to use to configure the storage resource, and wherein
6 each storage resource is capable of being configured by multiple storage
7 elements, each of which provides a different configuration of the storage
8 resource;
9 maintaining service information for each storage element indicating at
10 least one storage attribute resulting from the configuration of a storage resource
11 by the ~~that~~ element;
12 receiving at least one administrator specified service attribute for the
13 configuration of the storage resource;
14 ~~determining~~ comparing the administrator specified service attribute to the
15 service information to determine one storage element and storage resource
16 configured thereby having for which the service information ~~indicating~~ indicates at

17 least one service attribute that ~~satisfies~~ matches the administrator specified
18 service attribute;
19 ~~determining storage resource instances capable of being configured by~~
20 ~~the determined element; and~~
21 using the determined storage element to configure ~~the determined~~ storage
22 resources indicated in the service information to implement the specified service
23 attributes.

1 52. (Original) The article of manufacture of claim 51, wherein the administrator
2 specified service attribute indicates a level of data redundancy for the storage
3 resource to configure.

1 53. (Original) The article of manufacture of claim 51, wherein the at least one service
2 attribute in the service information indicates at least one performance and
3 availability attribute resulting from the configuration of the resource by the
4 element.

1 54. (Original) The article of manufacture of claim 51, wherein the configurable
2 storage resources comprise virtualization appliances.